DISPENSER FOR CREAMY PRODUCTS, COMPRISING AN AXIALLY SUNK CAP

Technical field

[1] The invention relates to the field of dispensers, typically flasks or flexible tubes, containing fluid products in the form of a paste, cream, oil or powder. It is related more particularly to dispensers that dispense the products through a single off-centred orifice or several orifices, particularly for application on a support such as the skin.

State of the art

[2] A very large number of fluid or powder product dispenser - applicators is known.

[3] Thus, French patent FR 2 820 958 describes a ball dispenser - applicator for fluid cosmetic products. Similarly, French application FR 2 845 578 discloses a digital dispenser for a paste cosmetic product with a head including a plurality of orifices and a closing cap.

[4] In general, the dispenser head includes a central circular orifice that is not adapted or is poorly adapted to direct application of the product onto the skin in the case of a cosmetic or dermatological product, or on any support in the case of another product. In this case, the application means are the palm of the hand or fingers, with the accompanying disadvantages particularly in terms of hygiene and cleanliness.

[5] However, the dispenser head may include a plurality of orifices or an off-centred orifice. In this case, the whole dispenser head is closed off by a cap. As a result, the orifices are not closed individually (depending on the nature of the packaged product) and therefore there may be product losses or dirt on the outside surface of the head, continuously and in variable quantities. Furthermore, it may be difficult to obtain a sealed closure, except by strong manual efforts to open and close the cap beyond what is currently acceptable as a normal force by a user.

[6] Finally, there may be a problem with the orifices becoming gradually blocked, depending on the nature of the product packaged in the dispenser.

[7] Thus, dispenser heads are rarely adapted to directly and efficiently apply the

product, particularly because it would be difficult or inconvenient to close the orifices in a leak tight manner with a shape adapted for such an application.

[8] The invention is directed to a dispenser - applicator with a head containing several orifices or at least one non-circular or non-centred orifice, provided with a closure that closes the orifice(s) in a sealed manner.

[9] In particular, the head may be adapted to apply the product onto the support with a particular product distribution and/or to massage the product onto the support, typically a massage onto skin, the orifice then being closed when required by simple axial sinking of a cap, wherein fixing is achieved, for example, by reversible click fitting, although in this case the orifice is not a traditional orifice, namely a single centred orifice along the axial sinking direction.

Description of the invention

[10] According to the invention, the dispenser - applicator of a fluid or powder product, typically a cosmetic product, onto a support (typically the skin) includes a receptacle, typically a flask or a flexible tube that will hold the product, the receptacle being formed from a body and a distribution head provided with a wall with at least one orifice, and a cap for blocking the distribution head by being sunk onto the head along a direction D, the cap including a first means of reversible fixing by axially sinking the cap along a direction D, typically a rim or a click fit groove, the head including a second reversible fixing means, typically a groove or a click fit rim, the first and second reversible fixing means cooperating such that the cap can block the head after having been axially sunk along the direction D. This dispenser - applicator is characterised in that:

a) the single orifice or the plurality of n orifices does not have symmetry of revolution about any axis parallel to the sinking direction D;

b) the cap includes a bottom with a single axial projection or a plurality of n axial projections with a section adapted to the section of the single orifice or the plurality of n orifices, such that the orifice(s) is (are) closed off by the axial projection(s) at the end of the axial sinking process;

c) the cap is provided with a first orientation means and the head is provided with a second orientation means, the first and second orientation means cooperating during the axial sinking process so as to:

c1) first orient the cap with respect to the head by relative rotation about an axis A parallel to the sinking direction D, such that the single axial projection or the plurality of n axial projections faces the single orifice or the plurality of n orifices without touching the wall provided with the orifice(s), then

c2) control axial displacement of the cap towards the head such that the axial projections close off the orifice(s).

[11] Since the sinking direction D is parallel to an axis A that in general coincides with an axis of symmetry of the head and the cap, sinking along the direction D is called axial sinking. Similarly, the so-called axial projections are projections that are elongated along the direction D.

[12] Thus, due to this combination of means a) to c), simple axial sinking of the cap will automatically orient the cap with respect to the head and thus close off the orifice(s) regardless of their position, shape and number on the head, provided that the cap is allowed to turn freely about its axis A during the axial sinking, thus keeping the head clean and limiting the risks of product loss.

[13] With the invention, it becomes possible to choose orifice shapes suitable for direct application of the product onto the skin or onto the face, particularly in the case of a cosmetic product or a dermatological care product, or for use on any other type of support for example for a product such as a glue or adhesive, without the problem of closing off the orifice(s) limiting possible shapes. For dispensers adapted for direct application onto the skin, the orifice(s) is (are) advantageously surrounded by a rim-shaped edge for a massaging effect.

[14] The fact that the axial projection(s) close off the orifice(s) each time that axial sinking takes place, and that the orifice(s) is (are) in the form of a single orifice or a plurality of orifices, prevents progressive blocking of the orifice with time, as can happen with some types of products, for example products that tend to dry or harden on contact with air.

[15] In general, dispensers designed for direct application of a product onto the skin

have a top wall in which the single orifice or the plurality of n orifices is (are) formed. This top wall is in the form or a dome with a fairly wide central part in which the orifice(s) is (are) formed, and is substantially plane, or slightly convex or on the contrary has a slight depression, substantially perpendicular to an axis A parallel to the sinking direction D which frequently coincides with an axis of symmetry of the head, and a peripheral part rounded to avoid injuring the skin. The cap is then frequently designed such that it has a bottom substantially perpendicular to an axis A parallel to the sinking direction D, which frequently coincides with an axis of symmetry of the cap. This bottom reaches close to the central part of the top wall of the head, at the end of the sinking process.

[16] The bottom of the cap is provided with the axial projection(s) that typically form a sealing pin or a plurality of n sealing pins. Due to its section adapted to the section of the orifice corresponding to it, the pin or each of the pins may close off the single orifice or the plurality of n orifices at the end of the axial sinking process, typically by axial sinking of its free end into the orifice, or by annular pressure on the edge surrounding the orifice.

[17] Many dispensers, particularly dispensers designed for the application of a fluid product onto a support such as the skin, have a top wall with a circular peripheral contour and a substantially cylindrical sidewall bearing on the circular peripheral contour, the assembly having a symmetry of revolution about an axis A parallel to the sinking direction D of the cap on the head. The sidewall is the to be substantially, or even perfectly cylindrical, or it may bear on a truncated cone with a half angle at the centre not more than a few degrees, typically less than 10°. In such a geometric configuration, it is advantageous to:

a) provide the cap with a skirt or a sidewall, also substantially cylindrical, that matches the shape of the sidewall of the head, on the outside;

b) provide the sidewall of the head and the skirt or sidewall of the cap of the first and second orientation means.

[18] For a single off-centred orifice or a plurality of orifices with an arrangement with no axis of symmetry about the axis A, the first and second orientation means are unique. However, if there are several orifices and if their arrangement has a

symmetry of order n about the axis A (the same arrangement is obtained after rotation of $2\pi/n$ about the axis A, where n is an integer number strictly greater than 1), the first and second orientation means themselves are advantageously arranged respecting a symmetry of order n/k, where k is an integer greater than or equal to 1, about the axis A (the same arrangement is obtained after a rotation of $2k\pi/n$ about the axis A).

[19] The first and second orientation means may for example be systems combining substantially helical ramps acting as a stop to radial projections to perform function c1), and axial grooves guiding the radial projections at the end of the axial sinking process to perform function c2).

[20] A "substantially helical ramp" means a radial projection extending around the axis A, with a continuously increasing or continuously decreasing slope along the circumferential direction, like a spiral. This is not necessarily a geometrically perfect spiral, because the slope is not necessarily constant. This slope must be sufficiently high to limit the sinking process duration until the orifices are closed off, but sufficiently low to limit the size. Typically, the result is an angle between 20° and 70° (defined with respect to the plane perpendicular to the axis A).

[21] Advantageously, the substantially helical ramps are twice as numerous as the radial projections and the axial grooves because they are associated in pairs and are placed on each side of an axial guide groove used for function c2), "descending" as far as the axial groove, thus imposing rotation in the clockwise direction or in the anti-clockwise direction of the cap, depending on the point at which the radial projection reached a stop on the ramp. Preferably, they "descend" towards the axial groove following the same slope profile, but with an opposite sign: the ramps, with a slope that is not necessarily constant, are symmetric about a plane passing through the axis and the axial groove. The terms "descending" and "rising" correspond to the convention according to which the dispenser is held vertically with the head at the top.

[22] Radial projections associated with the cap and the substantially helical ramps associated with the head have corresponding radial heights such that, regardless of their dimensional manufacturing tolerances, there is a sufficient radial overlap to

assure that the radial projections stop on the ramps. Typically, the objective will be a radial overlap equal to between 0.1 and 2 mm, preferably more than 0.5 mm.

[23] Obviously, these orientation means are interchangeable: the head is provided with ramps and grooves while the cap is provided with radial projections, or vice versa. If the ramps and grooves are located on the cap, and with the conventional presentation mentioned above in which the receptacle is held vertical with the head at the top, the substantially helical ramps are "ascending".

[24] The spatial configuration of the orientation means is advantageously defined such that during axial sinking of the cap on the head of the receptacle, the ends of the axial projections (pins) remain above the top wall of the head of the receptacle before the beginning of phase c2, for example in other words before the radial projections leave the substantially helical ramps to engage in the axial grooves.

[25] Thus, when the head is provided with the substantially helical ramps and axial grooves and the cap is provided with radial projections, it should be checked that the axial distance between the wall surrounded the orifice (or the top of the annular rim surrounding the orifice if there is one) and the boundary between the substantially helical ramp and the axial groove is greater than the axial distance between the bottom part of the corresponding axial projection (pin) and the bottom part of the radial projection.

[26] Similarly, when the cap is provided with the substantially helical ramps and axial grooves and the head is provided with radial projections, it should be checked that the axial distance between the wall surrounding the orifice (or the top of the annular rim surrounding the orifice if there is one) and the top part of the radial projection is less than the axial distance between the bottom part of the corresponding axial projection (pin) and the boundary between the substantially helical ramp and the axial groove.

[27] These orientation means that will frequently be stressed can be mechanically reinforced, for example by replacing the radial stops by axial ribs with a sufficient radial height so that one of their ends reaches the stop on the substantially helical ramp, and its thickness is slightly less than the width of the axial groove such that the rib can engage in the groove and be guided by the groove at the end of the

axial sinking process.

[28] Preferably, the sidewall of the dispenser head and the skirt or sidewall of the cap are also provided with the second and first reversible fixing means, typically continuous or discontinuous rims and / or click fit grooves (called "rice grains" if they are discontinuous), in order to limit the size. These rims, grooves or rice grains bear on a torus surrounding axis A as its axis of revolution, their section having a small radial height with small slopes on each side of the top, such that a given force is necessary to cross over this high point, and it is equally easy in the sinking direction and a withdraw direction.

[29] The dispenser head is assembled to the receptacle body by any known means. It may be screwed, click fitted or molded in a single piece with the receptacle body, by injection molding or compression molding. In particular, if it is a flexible tube, it may be insert molded onto the open end of a flexible skirt. It may also be molded separately and then welded to the sidewall of the distribution receptacle.

[30] The dispenser head may also be made by the assembly of an insert molded separately and then fixed onto a single receptacle head with a neck. In this case, the insert carries the top wall provided with the orifice(s) and the skirt or sidewall with the orientation means on its outside surface, and possibly the reversible click fit means of the cap. The skirt or sidewall of the insert is also provided with a second irreversible fixing means on its inside surface designed to cooperate with a first irreversible fixing means placed on the outside surface of the receptacle neck. These first and second irreversible fixing means may for example include a screwing thread, or preferably click fit rims with a large radial height and asymmetric slopes, which facilitate sinking of the insert that is fitted around the neck but preventing axial upwards movement. These irreversible fixing means are advantageously accompanied by anti-rotation means, typically a plurality of attached axial ribs located on the outside surface of the neck and on the inside surface of the skirt or the sidewall of the insert and arranged such that they form a series of teeth in relief on the surface of the neck which, after axial sinking, enters like a key into the lock consisting of the plurality of attached ribs arranged on the inside surface of the skirt or the sidewall of the insert. One or several rigid ribs

with a radial height such that their high point creates an indentation in all or part of the facing wall of the other part during assembly of the insert onto the head of the receptacle can also be used as anti-rotation means.

List of figures

[31] Figure 1 shows an exploded view in an axonometric projection of a dispenser head and a cap according to the invention.

[32] Figure 2 shows an axonometric view of a tube according to the invention, without its cap.

[33] Figure 3 shows an exploded view in an axonometric projection of the tube head in figure 2, before assembly, and of a cap according to the invention.

[34] Figure 4 shows an exploded view in an axonometric projection of another dispenser head and another cap according to the invention.

[35] Figure 5 shows 15 variants (denoted 5a to 5o) of single orifices or pluralities of orifices for which the geometric configuration has an axis of symmetry of order 2, 3, 4, 6 to 12, depending on the variants.

[36] Figure 6 shows 4 variants (denoted 6a to 6d) of orifices surrounded by a rim-shaped edge and associated with axial projections acting as sealing pins cooperating with the orifices.

[37] Examples

[38] To illustrate the invention, we present flexible tubes designed to apply sun cream directly onto the skin.

[39] Example 1 (figures 1, 2 and 3)

[40] The dispenser - applicator in example 1 is a tube 100 that includes a skirt 105 and a distribution head 120 provided with six orifices 121, and a cap 110 that will block the head by being sunk along the direction D of the axis A, which is the axis of symmetry of the head + cap assembly. The cap 110 includes a first reversible fixing means that is a discontinuous click fit rim in the form of rice grains 119 uniformly distributed about the axis A. The head 120 includes a second reversible fixing means that is a click fit rim 129. The first and second reversible fixing means 119 and 129 cooperate such that the cap 110 can block the head 120 after being sunk into the axial direction.

[41] The cap 110 includes a bottom 112 provided with 6 axial projections 111, that have a section adapted to the section of the 6 orifices 121 of the head such that the 6 orifices 212 are closed off by 6 axial projections 111 at the end of the relative sinking of the cap on the head.

[42] The cap 110 is provided with a first orientation means 115 and the head 121 is provided with a second orientation means 125 and 127, the first and second orientation means cooperating during the relative axial sinking of the cap on the head such that:

c1) firstly orienting the cap with respect to the head by relative rotation about the axis A, such that the 6 axial projections 111 are facing the 6 orifices 121, then

c2) axially displace the cap with respect to the head such 6 axial projections 111 sink into and close off the six orifices 121.

[43] The dispenser has a top wall 122 provided with 6 orifices 121. This top wall is in the form of a dome with a fairly wide central part 123, substantially perpendicular to the axis of the head that is provided with 6 orifices 121, and a rounded peripheral part 126. The bottom 112 of the cap is substantially perpendicular to the axis A and reaches close to the central part 123 of the top wall 122, at the end of the sinking process.

[44] The axial projections 111 typically form 6 sealing pins. Due to its section adapted to the section of the orifice corresponding to it, each of the pins can hermetically close each of the orifices 121 by sinking at the end of the axial sinking process.

[45] The top wall 122 has a circular peripheral contour and a cylindrical sidewall 124 bearing on the circular peripheral contour, the assembly having a symmetry of revolution about the axis A parallel to the sinking direction of the cap on the head. The cap 110 is provided with a cylindrical sidewall 114, the outside of which matches the shape of the sidewall 124 of the head. The sidewall 124 of the head 120 and the sidewall 114 of the cap 110 are provided with the first and second orientation means. These complementary orientation means are systems combining helical ramps 125 used as a stop at the end of an axial rib 115 to perform function c1), and grooves 127 guiding the axial rib ends 115 when they

reach the end of travel of the helical ramps, to perform function c2).

[46] The dispenser in this example 1 has six axial ribs 115, six grooves 127 and twelve helical ramps 125 associated in pairs, each pair of ramps having equal slopes (but with opposite sign), "descending" as far as an axial groove 127. In absolute value, the slope of these helical ramps is constant at an angle α close to 45°. The "bottom" end of the rib 115 acts as a radial projection 1150 that reaches the stop on the helical ramp 125 during sinking of the cap on the head, which makes the cap turn, and is thus guided as far as the angular position of the groove 127 at which the rib 115 finally engages.

[47] These orientation means are uniformly distributed around the axis A. The arrangement of axial grooves, pairs of ramps surrounding an axial groove and ribs has an order 6 symmetry about the axis A, in the same way as for the orifices.

[48] The axial ribs 115 are slightly thinner than the width of the axial grooves 127 such that the axial rib 115 can engage in an axial groove 127 at the end of the axial sinking process.

[49] The sidewall 124 of the dispenser head 120 and the sidewall 114 of the cap 110 are also provided with second and first reversible fixing means 129 and 119.

[50] The dispenser head is created by the assembly of an insert 130 molded separately and then fixed onto the single head 101 of the tube provided with a neck 102. The insert 130 carries the top wall provided with the orifice(s) and the sidewall provided with the orientation means on its outside surface and the reversible click fit means of the cap. The sidewall of the insert is also provided with a second irreversible fixing means (not shown) on its inside surface, that will cooperate with a first click fit rim 103 arranged on the outside surface of the neck 102. This click fit rim has a large radial height and asymmetric slopes, which facilitate sinking of the insert fitted around the neck but preventing an axial upwards movement.

[51] These irreversible fixing means are accompanied with anti-rotation means, in this case a plurality of attached axial ribs 104 located on the outside surface of the neck 102 and that are arranged such that they form a series of teeth in relief on the surface of the neck that, after the axial sinking process, enters like a key into the

lock formed by the plurality of attached axial ribs (not shown) arranged on the inside surface of the sidewall of the insert.

[52] During axial sinking of the cap on the receptacle head, the ends of the pins 111 remain above the top wall 122 of the receptacle head before the beginning of phase c2, in other words before the radial projections 1150 leave the ramps 125 to engage in the axial grooves 127. To achieve this, the axial distance between the wall surrounding the orifice and the boundary 128 between the substantially helical ramp 125 and the axial groove 127 is greater than the axial distance between the bottom end of the corresponding axial projection 111 and the bottom part 1150 of the rib 115.

[53] Example 2 (figure 4)

[54] Example 2 shows another embodiment of the invention with reversed orientation means: the dispenser head, in this case represented by an insert 230, is simply provided with axial ribs 225 and the inside surface of the sidewall 214 of the cap 210 is provided with helical ramps 215 associated in pairs and separated by axial grooves 217. The cap 210 is provided with 6 pins 211 arranged uniformly about the axis A.

[55] In this case, the inside surface of the insert is provided with a screwing thread 234 that will cooperate with a screwing thread formed on the neck of the tube. In one variant (not shown) that can be installed on the tube head 101 illustrated in figure 3, the inside surface of the insert is provided with one or several annular rims that have a sufficient radial height to come into contact with the edge of the teeth 104 of the neck 102, which forms an impression in the rims, sufficiently deep to prevent the insert 230 from rotating relative to the tube head.

[56] The cap 210 includes a discontinuous annular rim 219 close to the peaks between the two ramps 215, that cooperates with the annular rim 229 formed on the sidewall of the insert, so as to make a reversible attachment of the cap on the head.

[57] Each pair of helical ramps 215 have opposite slopes, "rising" as far as an axial groove 217. The "top" end of the rib 225 acts as a radial projection 2250 that comes to a stop on the helical ramp 215 during sinking of the cap on the head,

which makes the cap turn and is thus guided as far as the angular position of the groove 217 in which the rib 225 finally engages.

[58] During axial sinking of the cap on the head of the receptacle, the ends of the pins 211 remain above the top wall of the head of the receptacle before the beginning of the phase c2, in other words before the radial projections 2250 leave the ramps 215 to engage in the axial grooves 217. To achieve this, the axial distance between the wall surrounding the orifice and the top part 2250 of the axial rib 225 is less than the axial distance between the lower end of the corresponding axial projection 211 and the boundary 218 between the substantially helical ramp 215 and the axial groove 217.

[59] Example 3 (Figure 5 - variants 5a to 5o)

[60] Dispensers that will be used for direct application of a product onto the skin have a top wall provided with a single orifice or a plurality of n orifices. This top wall is in the form of a dome with a fairly wide central part provided with the orifice(s).

[61] Figure 5 diagrammatically shows 15 orifice variants marked a to o, in the form of a single orifice or a plurality of orifices. The axial projections that will close off the orifices have similar sections.

[62] The orifices and the corresponding axial projections have axis of symmetries as follows:

- order 2 for variants 5f, 5g, 5h, 5i, 5j and 5o and 5k, 5l, 5m and 5n;
- order 3 for variants 5a, 5b, 5c, 5d and 5e and 5k, 5l, 5m and 5n;
- order 4 for variants 5f, 5g, 5h, 5i, 5j and 5o;
- order 6 for variants 5k, 5l, 5m and 5n;
- order 12 for variants 5l.

It can also be seen that:

• for some orifice configurations, there can only be one arrangement of the orientation means. For example, for variants 5a to 5e, the first and second orientation means must necessarily be arranged respecting an order 3 symmetry;

• for other orifice configurations, there are several possible arrangements for the orientation means. For example for variant 5l, the first and second

orientation means may be arranged with order 2, 3, 6 or 12 symmetry. With orientation means like those described in examples 1 or 2, it is preferable to have the highest possible order: there is thus a larger number of ramps and the ramps may have a greater slope for the same overall height, so that the cap reaches the right position more quickly.

[63] The number n of orifices is:

- 1 for variants 5c, 5e, 5i, 5m, 5n, 5o;
- 3 for variant 5d;
- 4 for variants 5a, 5h;
- 5 for variant 5f;
- 7 for variants 5b and 5k;
- 9 for variant 5g;
- 16 for variant 5j;
- 25 for variant 5l.

[64] Example 4 (figure 6)

[65] Figures 6a to 6d show different orifice closing embodiments (121a, 121b, 121c, 121d) by an axial projection (111a, 111b, 111c, 111d).

[66] Figure 6a shows a cylindrical axial projection 111a with a rounded lower end 1110a that closes off the annular inside rim 1210a of the orifice 121a formed on the top wall 122, surrounded by an annular rim 1220a to apply the product onto the skin with a massaging effect.

[67] Figure 6b corresponds to the case in which the lower end 1110b of the axial projection 111b is a truncated cone and in which the orifice 121b also has a truncated cone shaped inside surface 1210b complementary to the surface of the axial projection. The orifice 121b is surrounded by an annular rim 1220b that has a massaging effect.

[68] Figure 6c corresponds to the case in which the orifice 121c forms an annular seat 1210c and in which the lower end 1110c of the axial projection 111c has a rounded shape adapted to the shape of the seat. In this case, the sealed closure is not made by axial sinking into the orifice, but rather by bearing on the edge

surrounding the orifice. The orifice 121c is surrounded by an annular rim 1220c with a massaging effect.

[69] Figure 6d corresponds to the case in which the geometry of the orifice 121d and the geometry of the annular rim 1220d corresponds to that in figure 6a, while the axial projection 111d corresponds to that in figure 6b, the lower end 1110d of the axial projection 111d being in the form of a truncated cone.

[70] Figures 6a to 6d show the axial height ΔH corresponding to axial cooperation between the orifice and the axial projection. This height ΔH typically corresponds to the minimum height of the axial groove that enables axial displacement of the cap at the end of the sinking process of the cap, over a sufficient distance to give a sealed closure of the orifice.